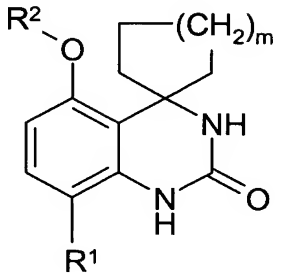
Claims

1. A compound of formula (I),



wherein

m is 1, 2 or 3;

R^1 is methyl, chloro, bromo or fluoro;

R^2 is $-Q^1-Q^2-Q^3-Q^4$ or (C_1-C_6)alkyl,

- said (C_1-C_6)alkyl is substituted with one to three OR^4, $COOR^4$, NR^4R^5, $NRC(=O)R^4$, $C(=O)NR^4R^5$ or $SO_2NR^4R^5$;
  - R^4 is (C_1-C_6)alkyl substituted with one to three F, CN, $S(=O)R^6$, SO_3H, SO_2R^6, SR^7, $C(=O)$-NH-SO_2-CH_3, $C(=O)R^7$, $NR'C(=O)R^7$, $NR'SO_2R^6$, $C(=O)NR^7R^8$, O-$C(=O)NR^7R^8$ or $SO_2NR^7R^8$;
  - R^5 is H or (C_1-C_6)alkyl optionally substituted with one to three F, CN, $S(=O)R^6$, SO_3H, SO_2R^6, SR^7, $C(=O)$-NH-SO_2-CH_3, $C(=O)R^7$, $NR'C(=O)R^7$, $NR'SO_2R^6$, $C(=O)NR^7R^8$, O-$C(=O)NR^7R^8$ or $SO_2NR^7R^8$; or
- said (C_1-C_6)alkyl is
  1) substituted with one to three $OC(=O)R^{4a}$, SR^{4a}, $S(=O)R^3$, $C(=NR^9)R^{4a}$, $C(=NR^9)$-$NR^{4a}R^{5a}$, NR-$C(=NR^9)$-$NR^{4a}R^{5a}$, $NRCOOR^{4a}$, NR-$C(=O)$-$NR^{4a}R^{5a}$, NR-SO_2-$NR^{4a}R^{5a}$, NR-$C(=NR^9)$-R^{4a} or NR-SO_2-R^3; and
  2) optionally substituted with one or two OR^{4a}, $COOR^{4a}$, $C(=O)$-R^{4a}, $NR^{4a}R^{5a}$, $NRC(=O)R^{4a}$, $C(=O)NR^4R^{5a}$ or $SO_2NR^{4a}R^{5a}$;

     R^9 is H, CN, OH, OCH_3, SO_2CH_3, SO_2NH_2 or (C_1-C_6)alkyl; and

     R^3 is (C_1-C_6)alkyl optionally substituted with one to three F, CN, $S(=O)R^6$, SO_3H, SO_2R^6, $C(=O)$-NH-SO_2-CH_3, OR^7, SR^7,

$COOR^7$, $C(=O)R^7$, $O\text{-}C(=O)NR^7R^8$, NR^7R^8, $NR'C(=O)R^7$, $NR'SO_2R^6$, $C(=O)NR^7R^8$ or $SO_2NR^7R^8$;

R^{4a} and R^{5a} are the same or different and are H or $(C_1\text{-}C_6)$alkyl optionally substituted with one to three F, CN, $S(=O)R^6$, SO_3H, SO_2R^6, $C(=O)\text{-}NH\text{-}SO_2\text{-}CH_3$, OR^7, SR^7, $COOR^7$, $C(=O)R^7$, $O\text{-}C(=O)NR^7R^8$, NR^7R^8, $NR'C(=O)R^7$, $NR'SO_2R^6$, $C(=O)NR^7R^8$ or $SO_2NR^7R^8$;

Q^1 is a single bond or $(C_1\text{-}C_6)$alkylene;

Q^2 is a saturated 4- to 6-membered heterocyclyl comprising one or two O or N;

Q^3 is $(C_1\text{-}C_6)$alkylene;

Q^4 is a 4 to 8-membered, aromatic or non aromatic, heterocyclyl comprising 1 to 4 -O-, -S-, -S(=O)-, $-SO_2-$ or -N-, said heterocyclyl being optionally substituted with one to three -OR, -NRR', -CN or $-(C_1\text{-}C_6)$alkyl;

R is H or $(C_1\text{-}C_6)$alkyl;

R^6 is $(C_1\text{-}C_6)$alkyl optionally substituted with one or two -OR';

R^7 and R^8 are the same or different and are H or $(C_1\text{-}C_6)$alkyl optionally substituted with one or two -OR';

R^9 is H, -CN, -OH, $-OCH_3$, $-SO_2CH_3$, $-SO_2NH_2$ or $-(C_1\text{-}C_6)$alkyl;

R' is H or $(C_1\text{-}C_6)$alkyl; and

R'' is H or $(C_1\text{-}C_6)$alkyl;

provided that

1) the atom of Q^2 bound to Q^1 is a carbon atom; and

2) the atom of Q^4 bound to Q^3 is a carbon atom;

or a racemic form, isomer, pharmaceutically acceptable derivative thereof.

2. A compound of claim 1 wherein R^2 is $(C_1\text{-}C_6)$alkyl substituted with $-OR^4$, $-COOR^4$, $-NR^4R^5$, $NRC(=O)R^4$, $-C(=O)NR^4R^5$ or $-SO_2NR^4R^5$; R^4 is $(C_1\text{-}C_6)$alkyl substituted with one to three $-S(=O)R^6$, $-SO_2R^6$, $-NR'C(=O)R^7$, $-NR'SO_2R^6$, $-C(=O)NR^7R^8$, $-O\text{-}C(=O)NR^7R^8$ or $SO_2NR^7R^8$; R^5 is H or $(C_1\text{-}C_6)$alkyl optionally substituted with one to three $-S(=O)R^6$, $-SO_2R^6$, $-NR'C(=O)R^7$, $-NR'SO_2R^6$, $-C(=O)NR^7R^8$, $-O\text{-}C(=O)NR^7R^8$ or $SO_2NR^7R^8$; R^6 is $(C_1\text{-}C_6)$alkyl; and R', R^7 and R^8 are the same or different and are H or $(C_1\text{-}C_6)$alkyl.

3. A compound of claim 1 wherein R^2 is $(C_1$-$C_4)$alkyl substituted with $-NR^4R^5$ or $-C(=O)NR^4R^5$; R^4 is $(C_1$-$C_6)$alkyl substituted with $-S(=O)CH_3$, $-NHC(=O)CH_3$ or $-C(=O)NR^7R^8$; R^5 is H or methyl; and R^7 and R^8 are the same or different and are H or methyl.

4. A compound of claim 1 wherein R^2 is $(C_1$-$C_6)$alkyl substituted with one to three $-OC(=O)R^{4a}$, $-SR^{4a}$, $-S(=O)R^3$, $-NRCOOR^{4a}$, $-NR-C(=O)-NR^{4a}R^{5a}$, $-NR-SO_2-NR^{4a}R^{5a}$ or - $NR-SO_2-R^3$; and said $(C_1$-$C_6)$alkyl is optionally substituted with -OH or $-OCH_3$; R is H or CH_3; R^3 is $(C_1$-$C_6)$alkyl optionally substituted with one to three -F, -CN, $-S(=O)R^6$, $-SO_3H$, $-SO_2R^6$, $-C(=O)-NH-SO_2-CH_3$, $-OR^7$, $-SR^7$, $-COOR^7$, $-C(=O)R^7$, $-O-C(=O)NR^7R^8$, $-NR^7R^8$, $-NR'C(=O)R^7$, $-NR'SO_2R^6$, $-C(=O)NR^7R^8$ or $-SO_2NR^7R^8$; R^{4a} and R^{5a} are the same or different and are H, $(C_1$-$C_6)$alkyl optionally substituted with one to three -F, -CN, $-S(=O)R^6$, $-SO_3H$, $-SO_2R^6$, $-C(=O)-NH-SO_2-CH_3$, $-OR^7$, $-SR^7$, $-COOR^7$, $-C(=O)R^7$, $-O-C(=O)NR^7R^8$, $-NR^7R^8$, $-NR'C(=O)R^7$, $-NR'SO_2R^6$, $-C(=O)NR^7R^8$ or $-SO_2NR^7R^8$; R^6 is $(C_1$-$C_6)$alkyl; and R', R^7 and R^8 are the same or different and are H or $(C_1$-$C_6)$alkyl.

5. A compound of claim 1 wherein R^2 is $(C_1$-$C_6)$alkyl substituted with $-S(=O)R^3$; R^3 is $(C_1$-$C_6)$alkyl optionally substituted with one to three $-S(=O)R^6$, $-SO_2R^6$, $-NR^7R^8$, $-OR^7$, $-NR'C(=O)R^7$, $-NR'SO_2R^7$; $-C(=O)NR^7R^8$; or $-O-C(=O)NR^7R^8$; R^6 is $(C_1$-$C_6)$alkyl; and R', R^7 and R^8 are the same or different and are H or $(C_1$-$C_6)$alkyl.

6. A compound of claim 1 wherein R^2 is $(C_1$-$C_6)$alkyl substituted with $-S(=O)R^3$; and R^3 is $(C_1$-$C_6)$alkyl, preferably methyl.

7. A compound of claim 1 wherein R^2 is Q^1-Q^2-Q^3-Q^4; Q^2 is a saturated 4- to 6-membered heterocycle comprising a nitrogen atom; Q^3 is a linear $(C_1$-$C_4)$alkylene group; Q^4 is a 5- or 6-membered aromatic heterocycle comprising one to four nitrogen atoms, said heterocycle being optionally substituted with methyl.

8. A compound of claim 1 wherein R^2 is Q^1-Q^2-Q^3-Q^4; Q^1 is a single bond; Q^2 is a saturated 4 to 6-membered heterocycle comprising a nitrogen atom; Q^3

is $-CH_2-$; and Q^4 is a 5-membered, aromatic heterocycle comprising 2 nitrogen atoms, said heterocycle being optionally substituted with methyl.

9. A compound of claim 8 wherein R^1 is -Cl or -F.

10. A compound of claim 8 wherein m is 2.

11. 5'-(2-[(2-amino-2-oxoethyl)amino]ethoxy)-8'-chloro-1'H-spiro[cyclohexane-1,4'-quinazolin]-2'(3'H)-one;
8'-chloro-5'-([methylsulfinyl]methoxy)-1'H-spiro[cyclohexane-1,4'-quinazolin]-2'(3'H)-one;
5'-(2-{[2-(acetylamino)ethyl]amino}ethoxy)-8'-chloro-1'H-spiro[cyclohexane-1,4'-quinazolin]-2'(3'H)-one;
8'-fluoro-5'-[3-(methylsulfinyl)propoxy]-1'H-spiro[cyclohexane-1,4'-quinazolin]-2'(3'H)-one;
8'-fluoro-5'-([methylsulfinyl]methoxy)-1'H-spiro[cyclohexane-1,4'-quinazolin]-2'(3'H)-one; or
8'-fluoro-5'-(2-{[1-(1H-pyrazol-3-ylmethyl)azetidin-3-yl]oxy}1'H-spiro[cyclohexane-1,4'-quinazolin]-2'(3'H)-one.

12. A method of treating a disease for which PDE7 inhbition therapy is indicated in a mammal comprising administering to said mammal in need thereof a compound of claim 1.

13. A method of claim 12 wherein said disease is selected from T-cell-related diseases, autoimmune diseases, osteoarthritis, rheumatoid arthritis, multiple sclerosis, osteoporosis, chronic obstructive pulmonary disease (COPD), asthma, cancer, leukemia, acquired immune deficiency syndrome (AIDS), allergy, inflammatory bowel disease (IBD), ulcerative colitis, Crohn's disease, pancreatitis, dermatoses, psoriasis, atopic dermatitis, glomerulonephritis, conjunctivitis, autoimmune diabete, graft rejection, epilepsy, muscular atrophy and systemic lupus erythematosus.

14. A method of claim 13 wherein said disease is asthma, allergy or atopic dermatitis.

15. A method of claim 13 wherein said disease is osteoporosis.

16. A method of claim 13 wherein said disease is cancer.

17. A pharmaceutical composition comprising a compound of claim 1 together with a pharmaceutically acceptable carrier, excipient, diluent or delivery system.